From the New Deal to a New Century: A Short History of TVA

PRESIDENT FRANKLIN ROOSEVELT NEEDED INNOVATIVE SOLUTIONS IF THE NEW DEAL WAS TO LIFT THE NATION OUT OF THE DEPTHS OF THE GREAT DEPRESSION. AND TVA WAS ONE OF HIS MOST INNOVATIVE IDEAS. THE PRESIDENT ENVISIONED TVA AS A TOTALLY DIFFERENT KIND OF AGENCY. HE ASKED CONGRESS TO CREATE "a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise." On May 18, 1933, Congress obliged.

Right from the start, TVA established a unique problem-solving approach to fulfilling its mission—integrated resource management. Each issue TVA faced—whether it was power production, navigation, flood control, malaria prevention, reforestation, or erosion control—was studied in its broadest context. TVA weighed each issue in relation to the others.

From this beginning, TVA has held fast to its strategy of integrated solutions, though the issues have changed to meet an ever-changing environment.

1930s Even by Depression standards, the Tennessee Valley was in sad shape in 1933. Much of the land had been farmed too hard for too long, eroding and depleting the soil. Crop yields had fallen along with farm incomes. The best timber had been cut.

TVA went to work. It built dams to harness the region's rivers. The dams controlled floods, improved navigation, and generated electricity. TVA developed fertilizers, taught farmers how to improve crop yields, and helped replant forests, control forest fires and improve habitat for wildlife and fish.

The most dramatic change in Valley life came from electricity generated by TVA dams. Electric lights and modern appliances made life easier and farms more productive. Electricity also drew industries into the region, providing desperately needed jobs.

1940s and 50s During World War II, the United States needed aluminum to build bombs and airplanes, and aluminum plants required electricity. TVA met the growing need for electricity by building dams in record time. By the end of the war, TVA had completed a 650-mile (1,050-kilometer) navigation channel the length of the Tennessee River and became the nation's largest electricity supplier.

Even so, the demand for electricity was outstripping TVA's capacity to produce power from hydroelectric dams. Political interference kept TVA from seeking additional federal appropriations to build coal-fired plants, so

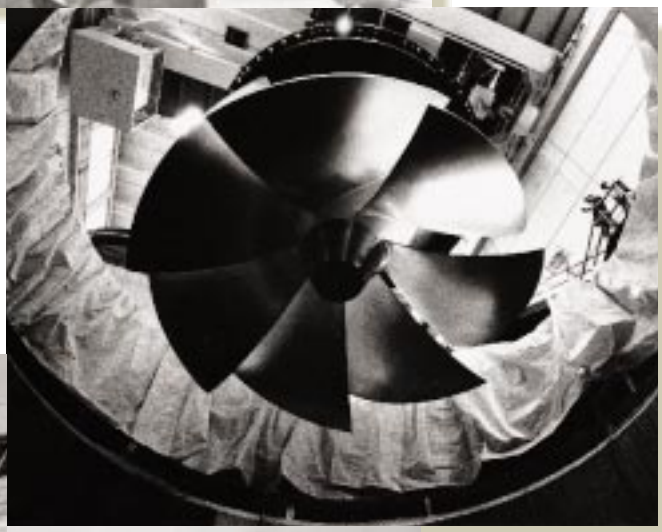
canceled several nuclear plants, as did other utilities around the nation. To become more competitive, TVA began improving efficiency and productivity while cutting costs. By the late 1980s, TVA had stopped the rise in power rates and paved the way for maintaining stable rates for the next decade.

1990s As the electric-utility industry moves toward deregulation, TVA is preparing for competition. It cut operating costs by nearly $800 million a year, reduced its workforce by more than half, increased the generating capacity of its plants, stopped building nuclear plants, and developed a plan to meet the energy needs of the Tennessee Valley for the next 25 years.

TVA is strengthening its position as an energy leader in price, services, and environmental stewardship as it helps guide the utility industry into the 21st century. ■

it sought the authority to issue bonds. Congress passed legislation in 1959 to make the TVA power system self-financing. TVA's power system would pay its own way.

1960s The 1960s were years of unprecedented economic growth in the Tennessee Valley. Farms and forests were in better shape than they had been in generations. Electric rates were among the nation's lowest and stayed low as TVA brought larger, more efficient generating units into service. Expecting the Valley's electric power needs to continue to grow, TVA began building nuclear plants as a new source of economical power.



1970s and 80s The economy changed in the Valley and the nation, prompted by an international oil embargo in 1973 and accelerating fuel costs later in the decade. The average cost of electricity in the Tennessee Valley increased fivefold from the early 1970s to the early 1980s.

Energy conservation became an economic necessity for homeowners and businesses alike, and TVA became a national leader in promoting energy conservation. With energy demand dropping and construction costs rising, TVA

Sequoyah Nuclear Plant workers R.G. Lewis (left) and Ted Gatewood, part of a team that helped set a refueling outage record.

Nuclear News Is Good News

WITH THE COMPLETION OF WATTS BAR NUCLEAR PLANT UNIT 1 AND THE RESTART OF BROWNS FERRY NUCLEAR PLANT UNIT 3, TVA BECAME THE FIRST UTILITY EVER TO ADD TWO NUCLEAR GENERATING units to the power system at the same time.

But more important than being unique is how the added capacity will help TVA serve its customers. "Adding these two units increased TVA's net winter dependable capacity around 2,200 megawatts—9 percent," says TVA Nuclear President Oliver Kingsley. "The added capacity bolsters TVA's position to meet future increases in demand for electricity within its service area."

Performance of all five TVA Nuclear units continued to improve this past year:

- Reduced production costs by 11 percent.
- Achieved average capacity factor of 85 percent, approaching top quartile in nuclear industry.
- Kept five units in continuous, full-power operation during peak summer months of July and August.
- In April, employees at Browns Ferry Nuclear Plant completed a refueling outage in 31 days, which is 24 days fewer than the industry average.
- Process improvement/quality teams from TVA Nuclear received national recognition.

Hardworking TVA Nuclear employees are behind this success, emphasizes Kingsley. One good example: 30 High Impact Teams from Sequoyah Nuclear Plant, who completed the plant's Unit 2 spring refueling outage in a site record 50 days, 17 hours—under the watchful eye of the Nuclear Regulatory Commission.

"This outage cost $24 million," says Sequoyah Plant Outage Manager Larry Bryant. "Our previous best outage cost $27 million and took 64 days."

The outage planning took a year. "We researched what others were doing in terms of cost and duration," he says. "We told our managers, 'If we're going to stay competitive, we'll have to raise the bar.'" ■

Dollars to Deutsche Marks: An Unbeatable Bond

WHEN TVA SOLD $2 BILLION OF 10-YEAR BONDS THAT TRADED SIMULTANEOUSLY IN ALL MAJOR FINANCIAL MARKETS AROUND THE GLOBE, THE WORLD TOOK NOTICE. THE LARGEST BOND OFFERING IN 1995, IT EARNED TVA THE DISTINCTION OF "DEBUT BORROWER OF THE YEAR" FROM *INTERNATIONAL FINANCE REVIEW*.

"Selling bonds globally supports TVA's vision of being a recognized world leader in providing energy and related services and helps TVA broaden its investor base," says Chief Financial Officer David Smith.

Early this year, TVA built on its global reputation, issuing 5- and 30-year bonds internationally. In June, *Euromoney* magazine named TVA as "Best North American Issuer," based on the success of a variety of recent domestic and international offerings.

During the past two years, TVA Chairman Craven Crowell, Smith, Treasurer John Hoskins, and the financial staff have traveled to nine countries to talk to investors. "Most investors know the great things TVA has done from history books," says Smith. "We bring them up to date, telling them how we have reduced capital expenditures by 50 percent in the past two years, while continuing to increase our annual revenues and grow the business. We talk about setting an internal debt limit below the cap established by Congress—and keeping our electricity prices stable for 10 years."

TVA also has the innovative issues investors demand, including September's Deutsche mark bond—TVA's first issued in another currency. TVA teamed up with the European Investment Bank (EIB) to launch a 1.5-billion Deutsche mark offering in Europe at the same time the EIB launched a $1-billion offering in the United States.

Each corporation saved money by swapping proceeds with the other, which will allow TVA to make principal and interest payments in U.S. dollars. As a result, TVA sold Deutsche-mark-denominated bonds to a completely new international investor base at a lower cost than a dollar-denominated U.S. issue.

Many Deutsche mark investors were aware of TVA's worldwide reputation and held TVA in high esteem, but had not previously invested in TVA bonds because all previous issues were denominated in U.S. dollars. Many of them saw this as their only chance to invest in TVA bonds.

Fifteen countries in the European Union created the EIB to make long-term financing available to support balanced development. "This partnership furthered TVA's corporate vision of building alliances for society's global needs," Smith says. "Very few issuers around the world could form and execute such a unique financial alliance." ■

ANOTHER FIRST

A minority firm managed a corporate bond sale for the first time in history when TVA launched a $300-million bond issue August 14. New York-based Blaylock & Partners served as lead underwriter for the intermediate-term, non-callable bonds.

TVA engineers helped create America's premier whitewater river on the Ocoee in southeastern Tennessee.

Bringing Olympic Gold to the Ocoee

ONE HUNDRED AND THIRTY KAYAKERS AND CANOEISTS FROM 36 COUNTRIES DUG AND PLUNGED AND SWOOOSHED THROUGH RAPIDS—"SMILEY FACE," "SLAM DUNK," "HUMONGOUS." FORTY-FIVE THOUSAND SPECTATORS, BROILED IN THE HOT SUN, HAPPILY CHEERING THE ATHLETES ON.

And 3.5 billion television viewers got a good look at whitewater slalom events of the 1996 Olympic Games, the first ever to be held on a natural river—the Ocoee in southeastern Tennessee.

All this was made possible because TVA's Ocoee No. 3 hydroelectric plant provided water releases for the two days of Olympic competition.

"A delight," was how the United Kingdom's *Economist* magazine described the competition. "In these largely private-sector Olympics, here was something strangely unfashionable: a small triumph of state enterprise, masterminded by that child of the New Deal, the Tennessee Valley Authority, and by the United States Forest Service."

TVA was one of the first to support the idea to hold the Olympic whitewater events on the Ocoee, committing TVA Water Management expertise to help study the feasibility of the venue, and agreeing to provide water for 145 days for pre-Olympic and Olympic events.

"Our idea all along was that if the events took place on the Ocoee, it would help TVA Economic Development support sustainable development in the area," says Betsy Child, Senior Vice President of TVA Economic Development. In the mid-1980s, copper mines were shut down in this hollow of the Southern Appalachians, leaving behind double-digit unemployment and 1,000 workers who only knew mining.

"We knew the whitewater events could be a golden opportunity to bring jobs and development to the region," says TVA Project Manager Rick Mallory.

TVA studied regions nationwide that were unable to reap the benefits from similar opportunities. So it joined forces with the U.S. Forest Service, the Tennessee, North Carolina, and Georgia tourism bureaus, local chambers of commerce, and interested individuals and organizations, to help the people of the region establish goals and an integrated plan for meeting them, a full four years before the Olympic Games.

TVA Economic Development assisted small businesses financially and as advisers and mentors. The staff developed regional-resource inventories and statistical profiles, an electronic information center, a World Wide Web Home Page, a 1-800 area-information number, and a regional brochure and media kit.

The result? The Olympics poured about $24 million in direct spending and $69 million in indirect spending into Polk County, and the whitewater rafting industry adds more than $30 million a year to the area economy. Local sales taxes were up 21 percent in 1995, and new business starts increased 39 percent in 1994.

And the average unemployment rate decreased 26 percent from 1990 to 1994—all because TVA was willing to part with some water. ■

A Thoroughly Modern Hydro

HYDRO POWER IS INEXPENSIVE TO PRODUCE. IT'S CLEAN AND IT HAS THE FEWEST ENVIRONMENTAL ISSUES OF ANY ESTABLISHED AND RELIABLE POWER SOURCE. ALL TRUE, EVEN IF, LIKE TVA, YOU HAVE MANY HYDRO GENERATING UNITS DATING BACK TO THE 1930S.

"TVA saw a chance to take the good qualities of its hydro program and make them better, using technology that no one dreamed of 60 years ago," says TVA Director Bill Kennoy.

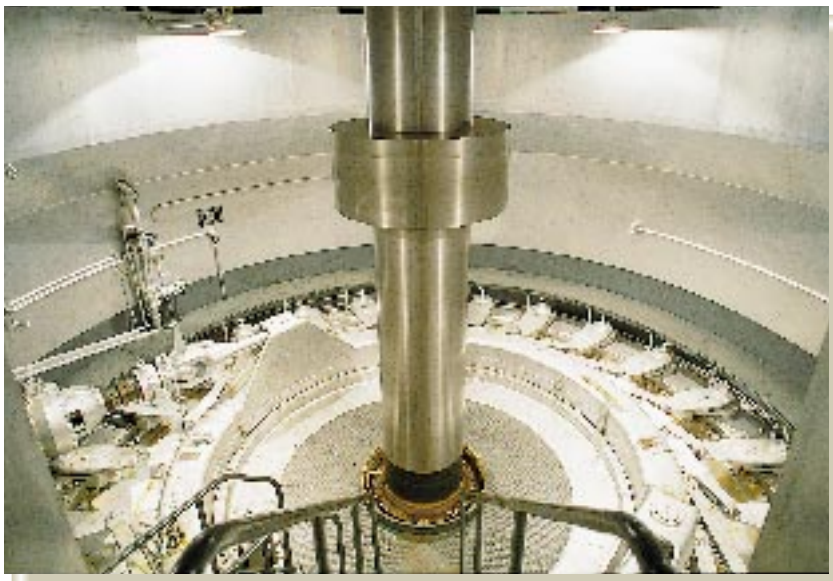
TVA is "modernizing"—refurbishing and upgrading 88 hydro units at 24 hydroelectric dams to be complete by 2010. These improvements will add 536 megawatts of capacity, enough to provide power to about 2,300 homes.

"It's the same concept as rebuilding a car engine to increase its power and extend its life," says Vice President of Hydro Operations Enrique (Henry) Martinez. "We're improving our generating capacity and cutting our future maintenance costs, working with what we have."

Hydro-modernization tasks run the gamut, from installing new turbine runners to replacing greased mechanical components with non-polluting greaseless components.

Here are a few more hydro accomplishments:

- Thirty-two megawatts of capacity were added to the hydro system this year.
- Six units were modernized in fiscal year 1996, bringing the total completed to 13.
- The completed projects have improved turbine efficiency by an average of 5 percent to date.
- The world's first two self-aerating discharge edge turbines were installed at the Norris hydroelectric plant. This new technology, jointly developed by TVA and Voith Hydro, adds oxygen to the water to improve water quality without sacrificing the generating efficiency of the plant.
- Chickamauga Unit 2 was modernized and returned to service in 90 days—a TVA record. ■



Gloria Lovett, Operations Supervisor at Kentucky Hydro Plant, one of 24 TVA hydroelectric dams to be upgraded by the year 2010.

Copper Basin Reclamation

AT ONE TIME, THE BARREN RED HILLS OF THE COPPER BASIN, WHICH DRAINS INTO THE OCOEE RIVER, COULD BE SEEN BY ASTRONAUTS ORBITING THE EARTH. UP CLOSE, MUCH OF THE COPPER BASIN LOOKED MORE LIKE THE GREAT BASIN OF NEVADA THAN TYPICAL HILL COUNTRY OF SOUTHEAST TENNESSEE.

But today, thanks to a cooperative private-public reclamation effort co-sponsored by TVA, the Basin is just another green valley.

"The recovery of the Copper Basin has to be one of the great reclamation success stories of all time," says Jack Muncy, who has worked closely with private industry and other groups as head of TVA's Cooperative Copper Basin Reclamation Project. "In terms of size, impact, and historic significance, I can't think of any project anywhere that can match it."

Two hundred years ago, the Copper Basin was a fertile valley with big timber, clear streams, and rich veins of copper running beneath its ridges. The problems began in the 1850s, shortly after the first copper mines opened in the Basin. Early mining companies set up refining operations that were crude, even by contemporary standards.

Copper was refined by heaping ore in piles with timbers and roasting off the sulfur, which produced sulfuric acid fumes. At times, the fumes were so thick that miners put bells on their mules to keep them from running into

one another.

Erosion was debilitating. Workers cleared forests to fuel the roasting fires, and dug up stumps when trees became scarce. Open-range grazing and burning to encourage grass helped prevent the forests from returning.

But it was the sulfuric acid fumes that pushed the Basin almost to the point of no return. After the railroad arrived in 1890 and the cost of transporting copper plummeted, the copper companies built smelters with tall stacks that carried fumes high into the air to rain down on neighboring hills and valleys, killing the remaining vegetation.

Without protective cover, the soft hills eroded into deep gullies. More than a meter of topsoil washed into nearby streams, suffocating fish by coating their gills, and smothering other aquatic life.

In the early 1900s, in one of the first major environmental lawsuits in this country, the U.S. Supreme Court ruled that the copper companies had to recover sulfuric acid to stop the acid rain. In the process, the Tennessee Copper Company discovered that acid was valuable—more valuable even than copper. And 90 years later, sulfuric acid is still the primary product of the Tennessee Copper Company's successor, Boliden Intertrade.

Reclamation of the Copper Basin began in the 1930s when the Tennessee Copper Company and TVA planted trees to combat erosion. These early attempts met with only moderate success, and much work in the 1940s and 1950s was devoted to finding plants that could tolerate the harsh conditions.

Reclamation by the copper and chemical companies' successor continued off and on during the next 50 years with some success. But by 1984, much of the Copper Basin was still a moonscape. Deeply concerned about the way the three Ocoee reservoirs were filling in with Copper Basin sediments, TVA stepped up the recovery. And TVA perfected a new approach—aerial seeding and fertilization. Private industry, other government agencies, and landowners joined in the effort.

The results have been phenomenal. "Soil erosion before reclamation was almost 200 tons per acre per year—about eight large tractor-trailer loads," says Muncy. "Within a year after treatment, it was less than a third of a tractor-trailer load—eight tons per acre per year."

Water quality in the Ocoee River is improving, fish are returning, and recreation is mushrooming. The Basin is green again. ■

TVA will help China harness water power from the Han River system, a tributary of the Yangtze River. Above, TVA Chairman Craven Crowell and China's Minister of Water Resources Niu Maosheng.

TVA Takes Expertise to China

WITH ITS 1.2 BILLION CITIZENS, AND AN ECONOMY THAT'S GROWING 10 TIMES FASTER THAN THE POPULATION, CHINA IS DESTINED TO BECOME THE LARGEST CONSUMER OF GOODS AND SERVICES in the world.

But China needs electric power and plenty of it for economic progress. That's where TVA comes in.

"Because of the similarities between the Tennessee Valley in the 1930s and many of China's river basins today, TVA's worldwide reputation as a successful manager of the Tennessee River system has great appeal to the Chinese," says TVA Chairman Craven Crowell.

In September, TVA and the State of Tennessee sponsored an Economic Opportunities Through Water and Energy Conference in Beijing. The conference created international trade opportunities for the 65 Tennessee Valley business leaders who attended.

TVA signed a memorandum of understanding with China's Ministry of Electric Power, which calls for TVA to cooperate with China in modernizing and automating that country's aging hydroelectric power plants. Other agreements, with China's Ministry of Water Resources and Lishui Hydro & Power Corp., could lead to TVA's involvement in development of the Han and Li rivers, and to China's tapping TVA's extensive flood-control expertise.

With scores of factories running under capacity because of electricity shortages, China announced in March that it intends to increase electrical generation by 40 percent in the next five years. Its plans for tapping the Han River system involve the construction of 12 new hydroelectric plants, generating 13.8 billion kilowatt-hours of electricity.

TVA won't manage Chinese projects, but will act as a consultant—a role that will improve business prospects for the Valley region.

"TVA made progress in achieving its international objectives by signing three agreements," says Crowell. "Now we're well-positioned to pursue activities in China." ■

LINKED BY LIGNITE

FIFTY MILLION YEARS AGO, THE SITE OF WHAT IS NOW THE CHESTER LIGNITE RESERVE IN MISSISSIPPI WAS A BOG. UNDER THE EARTH'S PRESSURE, ITS PEAT SLOWLY METAMORPHASIZED TO LIGNITE, A SOFT COAL PRODUCT. LEFT TO COMPRESS FOR MILLIONS OF YEARS, THE LIGNITE WOULD FORM COAL, AND LEFT STILL LONGER, it could eventually form diamonds.

But TVA won't wait that long. It's helping the state of Mississippi tap the reserve's wealth now.

In June 1996, TVA agreed to contract with CRSS, Inc., and Phillips Coal Company to purchase power from a lignite-burning electric power plant in Choctaw County. The $480-million facility will be built at the North Chester Reserve Site and is expected to generate 1,000 jobs and $7 million in taxes.

Distributors committed to TVA power: Sam Head (left), Columbus Light & Water, and Tom Underwood, Tallahatchie Electric Power Association

The plant will provide power to TVA and steam to business and industrial firms expected to locate near the facility. "TVA and the distributors of TVA power in Mississippi worked together to make this long-term commitment possible," says TVA Director Johnny Hayes. "If it hadn't been for the distributors and TVA cooperating, this lignite plant would not be happening."

The distributors are equally appreciative of TVA's involvement in the effort. "TVA has never generated power in this state; they've just distributed it," says Sam Head, General Manager of Columbus Light & Water and past president of the Tennessee Valley Public Power Association.

"People on the south end of the TVA system didn't always have the reliability of service that most of the TVA system enjoys. This partnership should take care of that issue. Even those of us who aren't near the lignite plant are very happy to have it in our state."

Six distributors served on the planning team that culminated in the CRSS, Inc./Phillips Coal/TVA partnership. "I was pleased TVA was willing to include us in the preliminary planning," says Tom Underwood, General Manager of the Tallahatchie Electric Power Association. "There's no doubt it took all of us working together to make this a success." ■